Reported Trip Costs, Gross Revenues, and Net Returns for U.S. Atlantic Pelagic Longline Vessels

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ABSTRACT—Logbook set and trip summary data (containing catch and cost information, respectively) collected by NOAA's National Marine Fisheries Service (NMFS) were analyzed for U.S. pelagic longline vessels that participated in Atlantic fisheries in 1996. These data were augmented with vessel information from the U.S. Coast Guard. Mean fish weights and ex-vessel prices from NMFS observers and licensed seafood dealers, respectively, were used to estimate gross revenues. Comparisons revealed that net returns varied substantially by vessel size and fishing behavior (i.e. sets per trip, fishing location, season, and swordfish targeting). While the calculated economic effects of proposed regulations will depend on the descriptive statistic chosen for analysis, which itself depends on the type of analysis being conducted, results show that considering heterogeneity within this fleet can have a significant effect on predicted economic consequences.

Introduction

The U.S. Atlantic pelagic (midwater) longline fleet harvests a multitude of species. In a recent study by Cramer and Scott[1], over 30 species were included in a catch-effort analysis of the fleet. In 1996, approximately 75% of the trips reported landing swordfish, *Xiphias gladius*, 65% reported landing at least one of the BAYS tunas (i.e. bigeye, *Thunnus obesus*; albacore, *T. alalunga*; yellowfin, *T. albacares*; and skipjack, *Katsuwonus pelamis*), and 55% reported landing dolphin, *Coryphaena hippurus*. In addition, nearly one-third landed coastal sharks, including sandbar, *Carcharhinus plumbeus*; silky, *C. falciformis*; blacktip, *C. limbatus*; dusky, *C. obscurus*; and hammerheads, *Sphyrna lewini, S. mokarran, and S. zygaena* (Larkin et al.[2]). Landings of pelagic sharks and other species such as wahoo, *Acanthacybium solanderi*; oilfish, *Ruvettus pretiosus*; and blackfin tuna, *Thunnus atlanticus*, were also reported in relatively large numbers.

Increasingly stringent domestic regulations on individual stocks, including the highly migratory species (HMS), have affected vessels that target multiple species (NMFS, 1999a). The additional regulatory pressure, in part, has caused some Atlantic pelagic longline (PLL) vessels to adopt gear that 1) simultaneously targets multiple species or 2) can easily be modified to target other species once shark and swordfish quotas are met (South Atlantic Fishery Management Council[3]). The increasing trend toward multi-species targeting by PLL vessels indicates that traditional single-fishery economic analyses may overlook benefits and costs that are unique to multi-species operations. If so, reliance on economic analyses that only incorporates a single species may result in a suboptimal resource management decision (Wilson, 1982).

Atlantic sharks and North Atlantic swordfish are managed in the United States under authority of the Magnuson-Stevens Fishery Conservation and Management Act (the Magnuson-Stevens Act). Tunas and billfish, including swordfish, are also managed under the authority of the Atlantic Tunas Convention Act. A recently released fishery management plan (FMP) for HMS integrates the domestic management of Atlantic tunas, swordfish, and sharks pursuant to the Sustainable Fisheries Act (NMFS, 1999a). This FMP acknowledges the multi-species nature of the commercial fisheries by accepting, for example, swordfish landings and permit histories as sufficient justification for receiving (at least) "incidental" shark and Atlantic tuna longline permits (NMFS, 1999b).

Prior to implementing or revising an FMP, the costs and benefits of the proposed regulations must be assessed. To this end, the Magnuson-Stevens Act requires a Regulatory Impact Review (RIR) to identify expected changes in the net economic benefits to society (e.g. gross industry revenues less harvest costs). In addition, the Regulatory Flexibility Act (RFA) requires an assessment of potential economic impacts on small entities, such as changes in gross revenues and/or fishing expenditures for individual operations or different industry segments (U.S. Small Business Administration, 1998). The overall importance of economic information was appropriately summarized in the recently authorized HMS FMP:

[1] Cramer, J., and G. P. Scott. 1998. Summarization of catch and effort in the pelagic longline fishery and analysis of the effect of two degree square closures on swordfish and discards landings. U.S. Dep. Commer., NOAA, NMFS, Sustainable Fisheries Division Contribution MIA-97/98-17, 22 p. Avail. from NMFS Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149.

[2] Larkin, S. L., D. J. Lee, and C. M. Adams. 1998. Costs, earnings, and returns to the U.S. Atlantic pelagic longline fleet in 1996. Food and Resource Economics Staff Paper SP 98-9, 44 p., avail. from University of Florida, P.O. Box 110240, Gainesville, FL 32611-0240.

[3] South Atlantic Fishery Management Council. 1997. Options paper for management of dolphin fish, 12 p., avail. from SAFMC, One Southpark Circle, Suite 206, Charleston, SC 29407.

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> An integral part of an FMP or FMP amendment is an analysis of the economic effects of the various management alternatives. This economic analysis is critical to identify the preferred measures that minimize economic impacts while meeting overall management goals (NMFS, 1999a:7–2).

The formal collection of economic data from vessels participating in Atlantic pelagic fisheries was not implemented until 1996. At that time, questions regarding trip expenses and labor payments were added to the trip summary form. Although the economic portion of the form was voluntary, complete information was obtained on 642 trips taken by 125 PLL vessels operating in the Atlantic in 1996. These observations accounted for 20% of the total trips and included information from 47% of the fleet.

The purpose of this paper is to present descriptive statistics on the Atlantic PLL fleet using the first economic data collected. Means are used to describe data in which observations are distributed normally and medians are used for observations with skewed distributions; this is because when the distribution of a variable is skewed (such as is common with housing prices and income) it is customary to use the median value to measure the central tendency (Cavanos and Miller, 1993). Given the skewedness of the frequency distributions on the behavioral, cost, and landings variables for this fleet as shown in Larkin et al.[2], the use of fleet-wide means presented in that analysis would provide an inaccurate quantification of the "average" or "typical" trip and set for use in calculating changes in total gross revenues as used in an RIR. The potential insufficiency of aggregate mean (i.e. arithmetical average) statistics to describe central tendency was also identified in regards to completing the RFA analysis in the recent HMS FMP, which stated that "due to the multi-species and multi-natured operation of HMS fishing vessels (i.e. wide range in vessel size, mileage per trip, geographic differences in fuel costs, etc.), averages should be used cautiously" (NMFS, 1999a:7–31).

Perhaps more importantly, "[w]hile the RFA analysis and NMFS guidelines focus on gross revenues, net revenues are a more accurate measure of both income and the net economic effect of regulatory measures" (NMFS, 1998:18). Focusing on changes in gross revenues ignores cost differences that can offset projected revenue changes from a proposed policy. Given the skewed distributions and availability of cost data, the bulk of our analysis compares median statistics and, in particular, net revenues. Comparisons are also made using gross revenues, costs, and mean net revenues. By examining differences between aggregate statistics and statistics calculated using disaggregated data (by region, number of sets, swordfish revenues, etc.), the effects on the resulting economic analysis (e.g. RIR and/or RFA) can be quantified.

The Data and Methods section contains a description of the data and the procedures used to create a single comprehensive data set for the U.S. Atlantic PLL fleet. The discussion is detailed in order to provide transparency and full disclosure in the analysis as recommended by the Office of Management and Budget (1996). The level of detail also allows for replication of the data set and consistency with future data sets. This is important because using a different procedure, order of procedures, or changing the underlying assumptions would alter the data and thereby change the economic outcome predicted by policy analyses in a way that could yield significantly different results.

To interpret economic findings for the entire industry, the Results section begins with a comparison of the population means (i.e. data for all trips, sets, and vessels) with the means from a subset of the population to assess whether the economic information in the subset was representative of the whole. Median statistics are then calculated for gross revenues by species, the costs of fishing supplies, and the estimated returns per trip across different vessel and trip characteristics. The data are examined at the trip level (in part) because, according to Squires and Kirkley (1995: 156), "the vessel-trip level represents the most complete disaggregate scale or level of production." In addition, the factors that affect trip expenses and landings (such as the quantity of fuel, bait, tackle, ice, and groceries and the type of bait and tackle) depend on the anticipated trip length, target species, season, and general area fished. The majority of these decisions (including the number of crew to hire) must be made prior to departure, remain constant during the trip, and affect decisions made during the trip. For these reasons, and since trip-level analysis was employed in the recent economic analysis of this fleet (NMFS, 1998; 1999a), trip-level aggregate and disaggregated analyses were included to provide additional useful information for this fishery.

In the Summary and Conclusions section, we briefly identify the main findings, reiterate the major assumptions, and consider how these data can be used in management decisions.

Data and Methods

This discussion focuses on the methods we used to 1) extract the PLL data from the pelagic fisheries data, 2) decide which vessel characteristics to consider (including how to define subgroups), 3) identify sources of fish weight and price data, and 4) define and calculate gross revenues, trip costs, and net returns.

NMFS requires U.S. vessels participating in Atlantic pelagic fisheries to submit 1) a record for each set including the gear used, fishing effort (length of mainline, number of hooks, type of bait, etc.), location, and numbers of each species kept (i.e. landings), and 2) a summary of each trip including the number of sets, departure and offloading ports and dates, and the first and last fishing days. These detailed summaries are often referred to as "set forms" and "trip forms," respectively, or generically as "logbook" forms or reports. In 1996, variable cost and payment questions were added to the trip summary form.[4]

[4]All logbook data obtained from NMFS were in raw (as reported) form; however, the set data contained additional variables identifying observations with suspected problems. We note where this information was used in the text.

NMFS received 17,239 set forms in 1996. Our data validation began with identifying discrepancies between the number of sets reported on the trip form and the number of set forms submitted with the same trip number. It was important that these numbers match since the landings from the set forms are aggregated and used to estimate the gross revenue received from each trip. Most differences involved the case where only one set form was submitted for a trip that reported placing multiple sets on the trip form. For these observations, which were identified in the data set by NMFS, we assumed the number of sets reported on the trip form to be accurate and that the landings on the set form represented the entire trip (i.e. the set form was a "summary" set). We also compared the dates of first and last fishing days from the trip form to the date of the set. If the reported set date did not fall within the reported fishing dates, we compared the set date to the number and dates of the other sets and trips by the same vessel. In most cases, the correct set date was obvious. The discrepancies between the set and trip information highlight the importance of cross-validating responses.

Since the owners or captains of all commercial vessels that target pelagic species are required to submit set forms, the data set contained information on all gear types. Following Cramer and Scott[1], we used the number of hooks to identify PLL sets since there was a very high response rate associated with this variable. In particular, the set was considered to correspond with the use of PLL gear if at least 100 hooks were reported.[5] To avoid excluding PLL sets by vessels whose owner/captain failed to report the number of hooks used, we also retained set forms that indicated the use of either "pelagic longline" or "longline but not bottom longline" gear (i.e. one of those gear types was checked on the set form). To avoid excluding sets and trips by PLL vessels whose owner/captain failed to answer the question, we also retained the sets and trips with corresponding trip and vessel numbers.[6] The remaining data set contained 16,549 sets placed during 3,352 trips by 276 vessels.

After aggregating the landings statistics from the set forms by trip number, we merged the resulting file with the corresponding trip logbook data. We deleted unmatched trip numbers from the file; these were observations with a trip summary form but without corresponding set forms and, thus, landings data.[7] The remaining data set contained 16,477 sets placed during 3,255 trips by 272 PLL vessels (i.e. 99.6% of total sets, 97.1% of total trips, and 98.6% of total vessels) operating in the Atlantic in 1996.

We supplemented the landings and cost data with vessel information maintained by the U.S. Coast Guard (USCG). The USCG requires all vessels displacing at least 4.55 net metric tons (t) (5 net tons) to register with the agency and receive a vessel identification number. We used the vessel identification number to obtain the displacement of each vessel. Nine vessels did not have a USCG number, which indicates they displace less than 5 net tons.

To determine gross revenues per trip, we turned to the 1996 trip logbook which included payments to the owner, captain, and the average paid to each crew member. Ideally, gross revenues would be determined by summing the owner, captain, and crew payments (i.e. the average payment times the number of crew) and knowing whether or when the various expenses were deducted. Given incomplete reporting (especially regarding the owner payment) and that information on how payments were determined was not collected, we could not estimate gross revenues from the reported payment information.

As an alternative to using the stated payments, we estimated gross revenues per trip from the landings data using mean weights and prices for each species. An advantage to using this approach is the ability to derive a gross revenue estimate for each species that reflects the underlying landings. In addition, the landings data may be more reliable since they are mandatory, submitted immediately upon docking, and less sensitive in nature than payment information.

For the fish weights, we first turned to the set logbook which asks for the total number of pounds kept. Ideally, these total weights would be used directly with price information to calculate gross revenue. In 1996, weight information was supplied for eight species and response rates ranged from 0.3% to 41%. Using the total weights with the landings for these species we computed mean individual weights for use with observations without data; however, the calculated mean weights were unrealistic, e.g. individual weights for yellowfin tuna ranged from 0.03–659 kg or 0.06–1,465 pounds. Given the extreme and unrealistic range of observed values (which could produce unrealistic gross revenue estimates) and the lack of information on the remaining species, we decided against using this information and instead opted for mean weights and prices from other NMFS data sources. The primary advantage of this approach is that NMFS has validated these data.

Licensed dealers are required to submit sales receipts, which are also known as "weight-out" sheets, containing the landed (i.e. dressed) weight of each fish purchased. Mean weights from these receipts in 1996 were the primary data source used in this study (Bertolino[8]). For species missing from the sales data, we used mean weights from the NMFS Southeast Region observer program (Lee[9]). Mean weights from either source were only used if

[5] Unlike Cramer and Scott[1], sets reporting fishing locations that were missing or could not be verified were not removed.

[6] Since the indicated use of PLL gear is not mutually exclusive to the use of other gears on the set forms, our analysis can include catch from all gears used during a PLL trip; however, the incidence of that was relatively small. For example, of the total 16,477 PLL sets, 2 reported using harpoons, 161 reported using rod and reel gear, and 93 reported using handline gear.

[7] We considered deleting these trips (3% of the total) preferable to assuming zero landings, which would artificially lower the mean and possibly the median revenue statistics if the set forms were misplaced or not submitted.

[8] Bertolino, A. 2 March 1998. NMFS Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149. Personal commun.

[9] Lee, D. 16 January 1998. NMFS Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149. Personal commun.

calculated from at least three observations. We obtained mean weights for species not included in either the sales or observer data from the HMS FMP (NMFS, 1999a). The FMP was not the primary data source since the report utilized common weights for the following species groups: tunas, large coastal sharks, pelagic sharks, and other fish. The FMP also provided information on how to calculate the landed weight of shark fins (NMFS, 1999a).

We calculated mean prices for each species from total longline landings and dockside value as reported by dealers in the Atlantic and Gulf of Mexico region in 1996 (NMFS[10]). For species not included in the longline landings summary we used the mean price for all commercial landings by species. Using this method the mean price is the average price per pound round (i.e. live or undressed) weight. Since mean weights were only available on a dressed-weight basis, these prices would be underestimated by the dressed-to-round weight conversion factor. We obtained factors used to convert dressed weight (dw) landings to round weight (rw) for swordfish and the majority of tunas and sharks from NMFS (Bennett[11]). The Florida Department of Environmental Protection[12] provided the dw-rw conversion factors for the remaining species. Table 1 contains the total landings, conversion factors, and mean weights and prices for each species used to estimate total industry gross revenues for 1996.

Of the 3,255 PLL trips with reported landings in 1996, 642 (20%)[13] provided fishing cost information including the quantity used and price paid for fuel, bait, and ice and the total cost of groceries. A subset of trips also provided the number of light sticks used and price per stick. If this information was missing, the number of lights sticks used was obtained from the set forms and multiplied by the mean price per light stick. Similarly, if ice expenses were recorded on one trip, the average daily cost for that vessel was used for missing observations. A "miscellaneous" cost variable was also created for trips that included an estimate of the total cost of the trip that exceeded the sum of the itemized supply costs.[14]

Variable fishing costs also requires an estimate of labor costs, however, we could not use the reported payments due to the data problems discussed earlier. Instead, we use a share system (discussed in the following paragraph) to derive this expense.

According to an experienced NMFS observer (who would prefer to remain anonymous; Lee[15]), and following the approach used by McHugh and Murray[16], returns to vessel owners are

Table 1.—Estimated gross revenue of the Atlantic pelagic longline fleet in 1996.

Species	Number landed	Mean weight (kg dw¹)	Conversion factor (dw to rw¹)	Mean price ($/kg rw¹)	Gross revenue ($ U.S.)
Swordfish	72,096	35.1	1.33	6.60	22,213,340
BAYS² tunas					
Bigeye	16,865	31.5	1.25	7.69	5,105,879
Albacore	4,888	18.5	1.25	2.11	237,985
Yellowfin	65,636	32.0	1.25	4.42	11,592,138
Skipjack	506	5.4	1.25	3.49	11,916
Large coastal sharks					
Sandbar	20,976	14.4	1.39	0.69	289,234
Dusky	2,757	23.4	1.39	1.24	111,595
Silky	3,664	14.4	1.39	0.87	63,560
Bignose	24	19.4	1.39	1.53	990
Night	433	19.4	1.39	1.02	11,905
Blacktip	6,347	17.6	1.39	1.02	158,273
Spinner	822	19.4	1.39	1.11	24,565
Tiger	278	14.4	1.39	1.47	8,161
Hammerhead	3,791	28.4	1.39	0.22	33,198
White	32	19.4	1.39	1.42	1,224
Pelagic sharks					
Shortfin mako	3,124	48.6	1.39	1.91	403,318
Longfin mako	197	64.4	1.39	1.67	29,368
Porbeagle	1,059	31.5	1.39	1.80	83,463
Thresher	92	47.7	1.39	0.67	4,067
Bigeye thresher	495	44.1	1.39	2.82	85,635
Blue	207	32.0	1.39	0.16	1,430
Oceanic whitetip	331	15.8	1.39	0.18	1,288
Other	212	44.1	1.39	1.56	20,215
Other					
Greater amberjack	13	18.5	1.04	2.18	543
Banded rudderfish	6	19.4	1.04	1.69	204
Blackfin tuna	1,560	7.2	1.25	2.62	36,816
Bonito	109	2.7	1.00	1.89	556
Dolphin	37,671	30.2	1.20	3.93	5,360,885
King mackerel	100	19.4	1.04	3.69	7,424
Oilfish	5,599	9.9	1.00	1.33	73,907
Wahoo	3,678	12.2	1.04	3.98	184,868
Other tuna	242	31.1	1.25	5.91	55,521
Other shark	1,480	19.4	1.39	1.56	61,922
Other fish	1,751	19.4	1.04	1.73	61,078
Shark fins	46,321	20.3	0.05	25.93	1,220,759
Totals³	257,041				47,557,228

¹ dw = dressed weight, rw = round weight.
² BAYS represents the following tunas: bigeye, albacore, yellowfin, and skipjack.
³ Landings exclude the number of shark fins.

[10] NMFS, Fisheries Statistics and Economics Division, 1315 East-West Highway, Silver Spring, MD 20910. Personal commun.

[11] Bennett, J. 10 February 1999. NMFS Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149. Personal commun.

[12] Florida Department of Environmental Protection. 27 August 1998. Marine Fisheries Information System, 100 Eighth Avenue S.E., St. Petersburg, FL 33701. Personal commun.

[13] The low response rate is attributed to first time collection of economic data, optional completion, and ambiguous phrasing of certain questions (Larkin et al., text Footnote 2).

[14] For the total trip cost, respondents were instructed to include the cost of the itemized fishing supplies, and "freight and handling" fees, and any additional expenses such as gear and vessel maintenance fees and replacement tackle.

[15] Lee, D. 15 February 1999. Southeast Fisheries Science Center, NMFS, 75 Virginia Beach Drive, Miami, FL 33149. Personal commun.

[16] McHugh, R. J., and T. J. Murray. 1997. An analysis of the demand for and supply of shark. MARFIN Grant NA57FF0052, Final Report, 36 p., avail. from NMFS, SERO, 9721 Executive Center Dr. N., St. Petersburg, FL 33702-2432.

typically calculated as a share of total revenues less trip expenses excluding groceries. The owner's share (60% if absentee, 50% plus a portion of the crew share if also the captain) is used to cover fixed costs including loan payments, dry dock charges, depreciation, and accounting fees. In this study, we assumed all trips hired a captain (i.e. the vessel owner received 60% of net revenues) to avoid including reimbursement for captain's labor in the return to the owner. This was necessary since the trip summary form did not ask whether the captain was the owner. Consequently, we assumed the labor costs to equal the captain and crew share (i.e. 40% of net revenues) less grocery expenses. The bulk of the analysis will focus on differences in net returns to the vessel owner to cover fixed costs appropriated to the trip (i.e. short-run returns).[17]

Results

Population vs. Sample Trip Characteristics

The Atlantic PLL fleet landed over 257,000 fish and sharks valued at nearly $48 million in 1996 (Table 1). Although over 30 species were landed, four accounted for 77% of the total number landed, namely: swordfish (28%), yellowfin tuna (26%), dolphin (15%), and sandbar sharks (8%). Collectively, these four species also accounted for nearly 84% of the total gross revenue.

The mean characteristics of the trip, set, and PLL vessel in 1996 are compared to the characteristics of the sample with economic data in Table 2. With the exception of the number of hooks between floats, the mean of the majority of characteristics are very similar (i.e. differed by less than 10%). In general, lower standard deviations were associated with the sample data.

The economic information contained in the sample data is summarized in Table 3. Estimated trip revenues averaged $13,313 to reported average costs (i.e. variable costs excluding groceries and labor) of $5,959. The estimated owner's return (assuming a 60% share) averaged $4,412. The relatively large standard deviations suggests considerable variability in returns (more so than in the underlying revenues and costs), which indicates non-normal data distributions. For example, the standard deviations associated with gross revenues and costs exceeded the corresponding mean by 25% and 7%, respectively, but the standard deviation of the net return was 82% above the mean net return.

The median of the estimated owner returns equaled $2,242 (Table 3), indicating that returns were below that number on at least half of the trips in the sample. That the mean is 82% above the median indicates the distribution of returns, and, in fact, the distribution of each economic variable is positively skewed. Therefore, the median values are more representative of the fleet since they identify the characteristics of the majority better than the mean, which is sensitive to "outliers."[18] For example, even though mean shark revenues were positive, only by examining the median value is it revealed that no sharks were landed on at least half the trips (i.e. the median is zero). Since the median revenue for each species group ranged from zero to 38% of the corresponding mean, the "average" trip landed considerably less than indicated by the mean. Overall, the median gross revenues and supply costs were 33% and 38%, respectively, below their corresponding means. Consequently, using mean revenues, costs, or net returns would significantly overestimate the economic benefits for at least half of the trips in the sample. More importantly, in terms of the implications for policy analysis, a zero median suggests that at least half the trips would not have been affected by regulations on large coastal or pelagic sharks.[19]

Table 2.—Comparison of total data set with economic subsample.

Variable	All PLL trips[1]	Sample PLL trips[1]
Number of trips	3,255	642
Number of sets	16,477	3,559
Number of vessels	272	125
Mean trip characteristics		
Number of sets	5.06 (3.87)	5.86 (3.64)[2]
Trip length (days)	10.50 (7.69)	11.79 (7.63)
Number landed		
Swordfish	22.23 (51.13)	20.63 (42.46)
BAYS tunas	26.99 (45.19)	27.03 (41.21)
Large coastal sharks	12.02 (85.23)	9.04 (27.10)
Pelagic sharks	1.76 (12.34)	1.22 (4.19)
Other	16.07 (38.37)	16.67 (36.27)
Mean set characteristics		
Hooks	631.6 (271.8)	615.3 (271.1)
Hooks between floats	8.37 (45.62)	18.72 (88.30)
Light sticks	277.1 (192.4)[2]	269.9 (218.56)
Length of mainline (km)[3]	40.72 (15.86)	37.29 (15.26)
Gangion length (fm)[3]	50.07 (67.29)	48.38 (52.01)
Floatline length (fm)[3]	32.53 (39.47)	34.58 (33.37)
Mean vessel characteristics		
Length (m)[3]	17.40 (4.28)	17.28 (4.20)
Displacement (net t)	60.27 (42.63)	63.16 (43.35)
Age (years)	14.73 (7.59)	14.27 (8.56)

[1] Parentheses contain standard deviations for mean values.
[2] Figure from trip logbook, which had fewer missing observations.
[3] One kilometer (km) = 0.62 miles, one fathom (fm) = 6 feet, and one meter (m) = 3.28 feet.

Table 3.—Sample trip characteristics (*n* = 642).

Variable	Mean	Standard dev.	Median
Number of crew[1]	3.56	1.43	4
Gross revenues			
Swordfish	$6,356	$13,083	$2,157
BAYS tunas	5,092	8,202	1,917
Large coastal sharks[2]	363	1,097	0
Pelagic sharks[2]	211	797	0
Other	1,291	3,133	306
Total[3]	13,313	16,619	8,916
Supply costs			
Fuel	1,373	1,519	1,031
Bait	1,437	1,463	960
Ice[4]	340	325	256
Light sticks[4]	687	863	360
Miscellaneous[4]	2,122	3,970	305
Total[3]	5,959	6,376	3,666
Net revenue[3]			
Total	7,354	13,494	3,736
Return to owner (60% of total)	4,412	8,097	2,242
Return to captain and crew (40% of total less groceries)	2,347	5,255	1,111

[1] Missing values not included in calculations.
[2] Revenues from the sale of shark fins accounted for 52% and 34% of total large coastal shark and pelagic shark revenues, respectively.
[3] Since the values for the "total" and "return" variables were calculated from the raw data, calculations based on the means or medians may be different.
[4] Missing values assumed to equal zero.

[17] Using returns to cover fixed costs is appropriate for this trip-level (i.e. short-run) analysis. Fixed costs data would be needed, however, to construct an annual vessel profile. Unfortunately, such data have not been collected for this fleet.

[18] Using the empirical rule, 13% of the sample could be considered statistical outliers (Cavanos and Miller, 1993). These observations had either unusually high costs relative to landings (e.g. costs included expenses for multiple trips or an unforeseen event ended the trip) or vice versa.

[19] Operations that did not land any sharks despite targeting those species could incur indirect costs resulting from certain regulations. For example, although trip limits would not have been constraining, the loss of option to participate in the fishery (i.e. loss of permit) would have.

Table 4.—Characteristics of sample trips by vessel length.

Variable	<13.95 m (45 ft)	13.95–19.72 m (46–64 ft)	19.73–26.09 m (65–86 ft)
Number of trips	192	234	216
Median characteristics			
Number of crew	2	3	5
Number of sets	3	6	7
Trip length (days)	5	11	15
Hooks per set	300	596	828
Length of mainline	20.9 km (13 mi.)	38.6 km (24 mi.)	48.3 km (30 mi.)
Vessel length	12.1 m (39.7 ft)	16.7 m (54.8 ft)	21.8 m (71.5 ft)
Median gross revenues			
Swordfish	$2,157	$1,232	$3,081
BAYS tunas	0	1,590	6,282
Large coastal sharks	48	0	0
Pelagic sharks	0	0	0
Other	91	378	474
Total[1]	4,168	9,506	12,831
Median supply costs			
Fuel	251	980	1,866
Bait	258	900	2,250
Ice	90	300	400
Light sticks	198	186	827
Miscellaneous	57	417	1,405
Total[1]	1,158	3,352	8,410
Net return to owner			
Median	1,771	3,187	2,643
Mean	3,763	4,668	4,713

[1] The sum of individual items equals the total for each trip, but the median may not.

Table 5.—Characteristics of sample trips by number of sets.

Variable	1–3 Sets	4–6 Sets	7–9 Sets	10–21 Sets
Number of trips	194	197	153	98
Median characteristics				
Number of crew	2	4	4	4
Number of sets	2	5	8	11
Trip length (days)	4	11	13	18
Hooks per set	492	700	700	700
Length of mainline (km)	22.5	41.9	45.1	43.8
Vessel length (m)	13.3	18.2	18.8	20.0
Median gross revenues				
Swordfish	$ 616	$ 1,849	$ 4,314	$ 9,089
BAYS tunas	0	2,296	4,794	8,242
Large coastal sharks	0	0	0	0
Pelagic sharks	0	0	0	0
Other	0	365	711	735
Total[1]	2,507	8,395	14,173	24,779
Median supply costs				
Fuel	219	1,095	1,294	2,406
Bait	258	960	1,500	2,685
Ice	96	280	300	386
Light sticks	99	560	667	1,597
Miscellaneous	43	526	1,009	1,591
Total[1]	981	3,588	5,950	9,902
Net return to owner				
Median	642	2,216	4,264	9,117
Mean	965	2,804	5,291	13,097

[1] The sum of individual items equals the total for each trip, but the median may not.

Trip Characteristics

By Subgroup

To improve the precision of fleet characterization, trip statistics are compared by vessel length, number of sets, quarter, region, and the percentage of revenues from swordfish in Tables 4 through 8, respectively. These variables were chosen because they represented both vessel characteristics and behavioral aspects of the fleet that can be (or have been) considered for use in FMPs (NMFS, 1999a; Cramer and Scott[1]). The distinctions between groups were based on frequency distributions of all PLL trips (Larkin et al.[2]), various NMFS documents, and expert opinion concerning the operation of the fishery from NMFS employees referenced in this paper and cooperative industry members.[20]

Vessel length ranged from 9.1 to 28.8 m (30–95 feet) in the fleet and 10.3 to 26.09 m (34–86 feet) in the sample such that mean vessel lengths in the fleet and sample were similar. Vessels were grouped into three categories (10.3–13.94 m, 13.95–19.72 m, 19.73–26.09 m). The sample trips were approximately equally distributed between groups. Examination of Table 4 indicates that on the typical trip taken by the longest PLL vessels, the trips were longer, used more hooks per set, and set longer mainlines. Comparison of median revenues reveals that longer vessels landed more swordfish and BAYS tunas (which is reflected in the higher revenues since price is constant) and incurred higher median costs per trip. Median returns to the vessel owner, however, were highest for mid-length vessels due to relatively low costs. Median owner returns by vessel length ranged from 21% below to 42% above (for the shortest and the mid-length vessels, respectively) the sample median of $2,242 (Table 3). Comparison with the corresponding mean returns reveals that using the mean (with trip frequency data) would produce a larger economic impact for an RIR analysis and would change the relative impacts experienced by vessels of different sizes.

In Table 5, trips are grouped into the following four categories: 1–3 sets, 4–6 sets, 7–9 sets, and 10–21 sets. The last group contains the fewest number of total trips (15% of sample) and does not contain trips reporting more than 21 sets (0.2% of the total) because none provided economic information. With the exception of the shortest trips (i.e. trips placing 1–3 sets), the hooks per set and vessel length associated with the typical trip were relatively robust to the number of sets placed or trip length. Despite the similarity of trips reporting from 4–21 sets, the median net returns to vessel owners ranged from $2,216 to $9,117 (1% below to 307% above the sample median). When less than 4 sets were placed only swordfish were landed on the typical trip and the median return to vessel owners was 71% below the sample median. Again, the mean returns exceed the median but both descriptive statistics provide the same ranking of net returns. Thus, for some stratifications, estimation of relative differences in net returns are robust to the use of either the mean or the median.

Seasonal differences in median returns were examined by quarter: January–March, April–June, July–September, and October–December. Compared

[20] Using a clustering procedure to choose variables and define groups was not employed since clustering by gross revenue, total trip expenses, and estimated owner returns produced groupings that were not conducive to policy analysis.

to previous groupings (by vessel length and sets), trips are relatively homogeneous across quarters in terms of trip and vessel characteristics (Table 6). Swordfish, BAYS tunas, and the "other" species were landed on the typical trip throughout the year. However, effort during the cooler months (October through March, the first and fourth quarters) was characterized by slightly longer vessels using longer mainlines. Median trip revenues were lowest from January through March, the same quarter with highest swordfish revenues. From April through June, when median trip revenues were highest, median revenues for other species were nearly three times that of the other quarters. Median trip costs were highest from October through December, primarily from increased fuel expenses. Overall estimated returns to the owner were highest in the second quarter and lowest in the first, ranging from $1,472 to $3,449 (34% below to 54% above the sample median). As with the disaggregation by vessel length, and as will be shown by regions, the descriptive statistic selected for analysis affects the absolute measure of net economic benefits and the relative ranking of benefits between subgroups.

Geographic differences are examined in Table 7 by the location of the offloading port, which correspond with the areas used in Cramer and Scott[1], namely: 1) Maine to Virginia, 2) North Carolina to Miami, 3) Texas to Key West, and 4) the Caribbean. The majority of trips in the sample offloaded at ports located from Texas to Key West where the typical trip was characterized by the longest vessels using the most hooks per set. The typical trip offloading in the Caribbean placed the most sets, used the longest mainline, and was at-sea for the most days. In general, the longest vessels and trips characterized the typical trip landing in the southern regions (Gulf of Mexico and the Caribbean). Median returns to the owner were highest in the Caribbean (258% above the aggregate sample) while median returns to trips landing in Gulf ports were lower than in the aggregate sample. The typical trip landing at a Gulf port reported the largest landings of other fish but the majority of revenues were generated from BAYS tunas. Landings of BAYS tunas and pelagic sharks were largest from Maine to Virginia where lower costs resulted in higher median returns (19% above the aggregate median). The typical trip landing from North Carolina to Miami reported the lowest returns. The Caribbean region, with the highest returns, is characterized by substantial median swordfish revenues relative to the total median revenue and the median revenues of other regions (median swordfish revenues of $22,184 in the Carib-

Table 6.—Characteristics of sample trips by quarter.

Variable	Jan.–Mar.	Apr.–June	July–Sept.	Oct.–Dec.
Number of trips	195	184	175	88
Median characteristics				
Number of crew	4	4	3	4
Number of sets	5	6	5	6
Trip length (days)	10	11	10	14
Hooks per set	667	700	600	554
Length of mainline (km)	41.9	38.3	32.2	45.1
Vessel length (m)	18.2	16.7	15.2	18.8
Median gross revenues				
Swordfish	$4,005	$2,003	$616	$3,697
BAYS tunas	883	2,561	3,179	2,128
Large coastal sharks	0	0	0	0
Pelagic sharks	0	0	0	0
Other	108	1,023	397	187
Total[1]	6,761	11,027	7,395	9,378
Median supply costs				
Fuel	988	1,058	760	1,417
Bait	1,079	1,035	712	1,037
Ice	225	262	260	300
Light sticks	560	421	132	631
Miscellaneous	471	363	190	87
Total[1]	4,188	3,861	2,817	5,309
Net return to owner				
Median	1,472	3,449	2,097	3,227
Mean	2,839	4,746	5,405	5,227

[1] The sum of individual items equals the total for each trip, but the median may not.

Table 7.—Characteristics of sample trips by region.

Variable	Maine to Virginia	N.C. to Miami, Fla.	Tex. to Key West, Fla.	Caribbean
Number of trips	86	189	319	47
Median characteristics				
Number of crew	3	2	4	4
Number of sets	5	4	6	8
Trip length (days)	8	7	12	17
Hooks per set	692	400	800	500
Length of mainline (km)	32.2	23.2	46.0	54.7
Vessel length (m)	15.6	13.3	19.7	16.4
Median gross revenues				
Swordfish	$ 462	$ 2,157	$ 1,849	$22,184
BAYS tunas	3,961	0	3,179	2,447
Large coastal sharks	0	0	0	0
Pelagic sharks	192	0	0	24
Other	91	183	412	227
Total[1]	7,060	4,826	9,387	26,227
Median supply costs				
Fuel	753	410	1,266	1,970
Bait	965	590	1,000	2,705
Ice	185	150	330	300
Light sticks	94	198	597	1,295
Miscellaneous	171	42	821	1,560
Total[1]	2,831	1,928	5,230	10,100
Net return to owner				
Median	2,671	1,740	2,022	8,020
Mean	6,672	3,679	3,099	12,188

[1] The sum of individual items equals the total for each trip, but the median may not.

Table 8.—Characteristics of sample trips by swordfish revenues.

Variable	Percentage of total revenues from swordfish < 25%	25–49.9%	50–74.9%	75% +
Number of trips	272	105	87	178
Median characteristics				
Number of crew	4	4	3	3
Number of sets	5	6	7	4
Trip length (days)	11	13	12	9
Hooks per set	750	796	550	351
Length of mainline (km)	38.6	43.4	41.1	33.8
Vessel length (m)	18.2	20.9	16.7	14.6
Median gross revenues				
Swordfish	$0	$3,697	$5,854	$7,549
BAYS tunas	4,239	4,062	1,590	12
Large coastal sharks	0	0	0	0
Pelagic sharks	0	0	0	0
Other	470	435	412	93
Total[1]	8,332	9,082	9,748	8,828
Median supply costs				
Fuel	1,014	1,494	962	685
Bait	792	1,632	1,000	762
Ice	278	285	240	170
Light sticks	33	708	720	581
Miscellaneous	258	1,045	320	145
Total[1]	3,367	6,802	4,485	3,258
Net return to owner				
Median	2,017	1,885	2,419	3,288
Mean	3,834	2,830	4,351	6,260

[1] The sum of individual items equals the total for each trip, but the median may not.

bean region are nearly five times the combined median swordfish revenues of the other regions).

Note that the typical trip landing in the Gulf and Caribbean reported the same crew size and was characterized by longer vessels and mainline; however, swordfish landings and overall returns differed substantially. In this case, describing the fleet by length of the vessel or mainline would mask significant regional differences for the typical trip and thereby produce misleading economic effects of proposed spatial fishery closures.

Differences in median returns by swordfish targeting were also examined using the percentage of total revenue from swordfish since this species is often assumed to be the primary target of this fleet.[21] Table 8 shows that the typical trip characterized by swordfish revenues that accounted for at least 75% of total gross revenues had the highest returns ($3,288), took shorter trips, placed fewer sets, used fewer hooks per set and a shorter mainline. When swordfish revenues comprised less than 50% of total revenues, the typical trip was taken by longer vessels that set more hooks and landed more BAYS tunas.

Comparing the aggregate median return to vessel owners' ($2,242, Table 3) with the median returns by subgroup ($642–$9,117, Tables 4 through 8) allows the identification of subgroups (i.e. trips with particular characteristics) that are most similar to the aggregate sample. These trips were taken by the longest vessels (20–26 m) that placed 4–6 sets during the third quarter (July through September) and landed at ports in the Gulf of Mexico or North Atlantic with swordfish revenues that accounted for 50–74.9% of the total; median returns ranged from 6% below to 18% above the aggregate median. Despite the similarity of some subgroups with the sample median, the median returns of the remaining subgroups differed more substantially (especially for trips placing a different number of sets or landing in a different region). Figure 1 compares the median returns for the characteristics with the widest range.

To facilitate comparison of median returns with mean returns summarized in Larkin et al.[2], this information was included in Tables 4–8. For every subgroup the mean exceeded the median as anticipated due to the positively skewed distributions. This difference is important when absolute values are needed to estimate economic effects, such as in RIR and RFA analysis; however, relative differences in returns are only affected when the fleet is grouped by vessel length, season, and region. Hence, if the proposed regulation pertains to vessel size, seasons, and/or regions, the choice of descriptive statistic (mean vs. median) will likely affect the conclusions drawn from the analysis. Moreover, this effect could be significant given the observed variation in median net returns.

By Joint Subgroups

Given the dissimilarity in median owner returns between subgroups as shown in Figure 1, median returns were next calculated by the number of sets placed for each vessel length class, quarter, and region (i.e. the categories in Table 5 were disaggregated by the categories in Tables 4, 6, and 7, respectively) and compared to the aggregate median. As shown in Figure 2, median returns tended to increase with the number of sets across all groupings; however, within each set group returns varied quite substantially from the aggregate median by vessel length, quarter, and region. The median return was below the aggregate median for trips by the longest vessels placing the fewest sets, which could reflect trips that ended earlier than planned. The median return was highest for trips placing 10–21 sets that offloaded in the Caribbean. The typical trip in the Caribbean region also earned the highest returns in each set group. For trips placing the fewest sets (1–3), median returns were highest for short vessels and during the fourth quarter. For trips placing 4–9 sets, median returns were highest for mid-length vessels. Overall, median returns for these twice disaggregated groupings ranged from $1,498 to $18,241 per

[21] The set forms ask for "target" and supply 9 species as options. This information could not be used to uniquely classify each observation by species since responses are not mutually exclusive (making the number of possible combinations prohibitive to compare) and the response rate was low (40% of sets, 22% of trips).

trip or 168% below to 714% above the aggregate median.

In Figure 3, variations in median returns from the aggregate median are shown by the percentage contribution of swordfish to total trip revenues for each vessel length class, quarter, and region (i.e. the categories in Table 8 are disaggregated by those in Tables 4, 6, and 7, respectively). These differences reveal that targeting behavior had the largest impact on median regional returns. Swordfish targeted trips (where swordfish revenues were at least 75% of the total) in the northern region (Maine to Virginia) earned median returns in excess of 700% of the aggregate median. Conversely, Caribbean trips with swordfish revenues accounting for less than 25% of the total revenue also earned significantly higher median returns (nearly 600% above the aggregate median). When the medium and long vessels targeted swordfish, median returns were approximately 170% above the median, much higher than the median return earned by short vessels or for nonswordfish targeted trips. For comparison, recall that the examination of median returns by target level alone (Table 8) revealed that returns ranged from only 16% below to 47% above the aggregate median, which is a substantially narrower range than shown in Figure 3.

The temporal and spatial differences in median returns illustrated in the figures were based on revenues estimated using constant fish weights and prices from Table 1. Increasing precision in revenue estimation by including temporal and spatial price differences (as well as price difference by size of fish) would be an obvious extension to the present analysis. Of the 480 species, quarters, and regions for which data was possible (four quarters and four regions for each of the 30 species), landings were only reported for 263 (55%). Of the 263 prices needed to correspond with landings, only 95 (36%) were available from the NMFS database. In addition, only 27% of the prices needed for swordfish, yellowfin tuna, dolphin, and bigeye tuna (species that comprised over 93% of total revenues) were available. More importantly, prices were missing for 95%

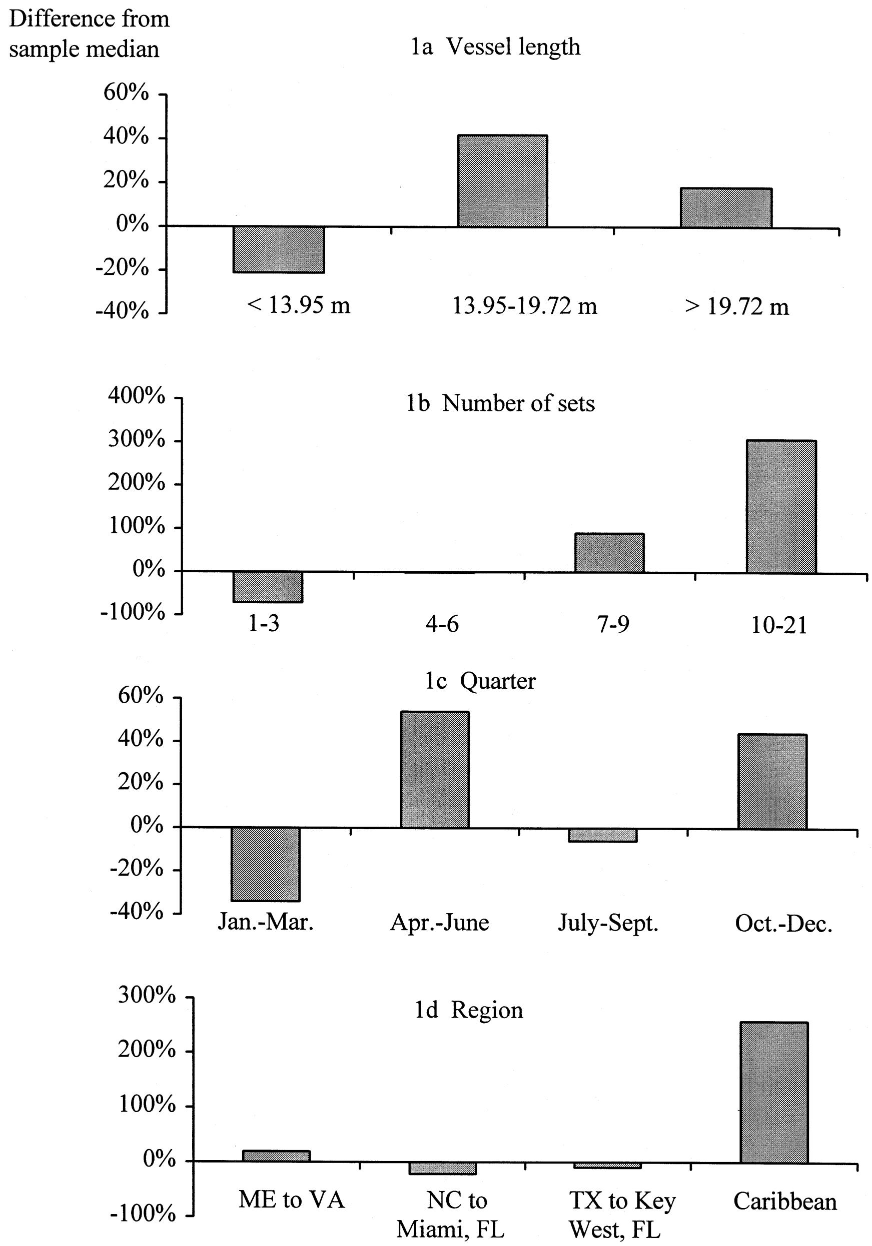

Figure 1.—Comparison of median net returns by trip type.

of yellowfin tuna landings and more than 98% of swordfish landings. Without temporal and spatial price information on (at least) the most predominate and valuable species, we could not adequately incorporate price heterogeneity. Temporal and spatial differences in landed weights may also impact the degree of heterogeneity in the fleet. A complete set of distinct weights that would correspond with the landings (263 in total) was not available because it is not collected and, thus, could not be included. For some species, such as swordfish, price per pound can vary with the size of the fish; however, no data describing this relationship were available for any of the species.

Summary and Conclusions

The detailed data description provided transparency in 1) the procedures used to synthesize the set logbook data, trip logbook data, fish prices, fish weights, weight conversion factors, and vessel information and 2) the definition of PLL observations, gross revenues, supply costs, labor costs, and net returns to the vessel owner. This transparency allows for the duplication of the data set or the creation of consistent data sets over time. Consistency in the data used by NMFS biologists is currently being provided through data filtering programs that identify, for example, incorrect location codes and summary sets. This analysis revealed that similar programs could be developed for the economic data. For example, a program could flag observations where 1) implied fish weights (calculated from the reported pounds kept and number landed) fall outside of a reasonable range, 2) estimated gross revenues exceed total payments, and 3) the reported number of sets and set dates do not coincide with trip dates or the number of corresponding set forms.

In terms of data analysis, the population consisted of all Atlantic PLL trips in 1996 that were known to NMFS through the logbook program. The sample data set consisted of a subset of these trips where cost information was provided on the trip logbook form. The sample was representative of the population in terms of the range of vessel types and fishing behavior (Table 2). The use of the logbooks to collect information appears to be effective given the response rate and that 1) fishermen are already familiar with the form and submission procedures; 2) the availability of corresponding catch data and gear use can supplement and verify (i.e. cross-validate) reported information; 3) the data can be analyzed at the trip, set, or (especially if mandatory) the vessel and annual level; and 4) the information can be collected at a relatively low cost. Continually collecting this information would also allow for the estimation of economic models over time and reduce the probability of recall bias compared to periodic surveys. Having a time series of economic information that corresponds to landings also complements studies that have focused on estimating regulatory effects using changes in landings (e.g. Cramer and Scott[1]). Ideally, the variable cost information would be supplemented with fixed cost data collected on permit renewal forms (Curtis[22]), voluntary proprietary data from cooperative industry members (as used here to verify reported variable cost information), and periodic surveys in order to conduct a long-run analysis.

In terms of the economic results, comparisons were made with trip-level data using (primarily) median net returns to the vessel owner to cover fixed costs. Given the multi-species nature of HMS fisheries and PLL gear, all landings were included in the underlying gross revenue calculation. Trip-level analysis was selected since 1) many decisions that affect returns are made

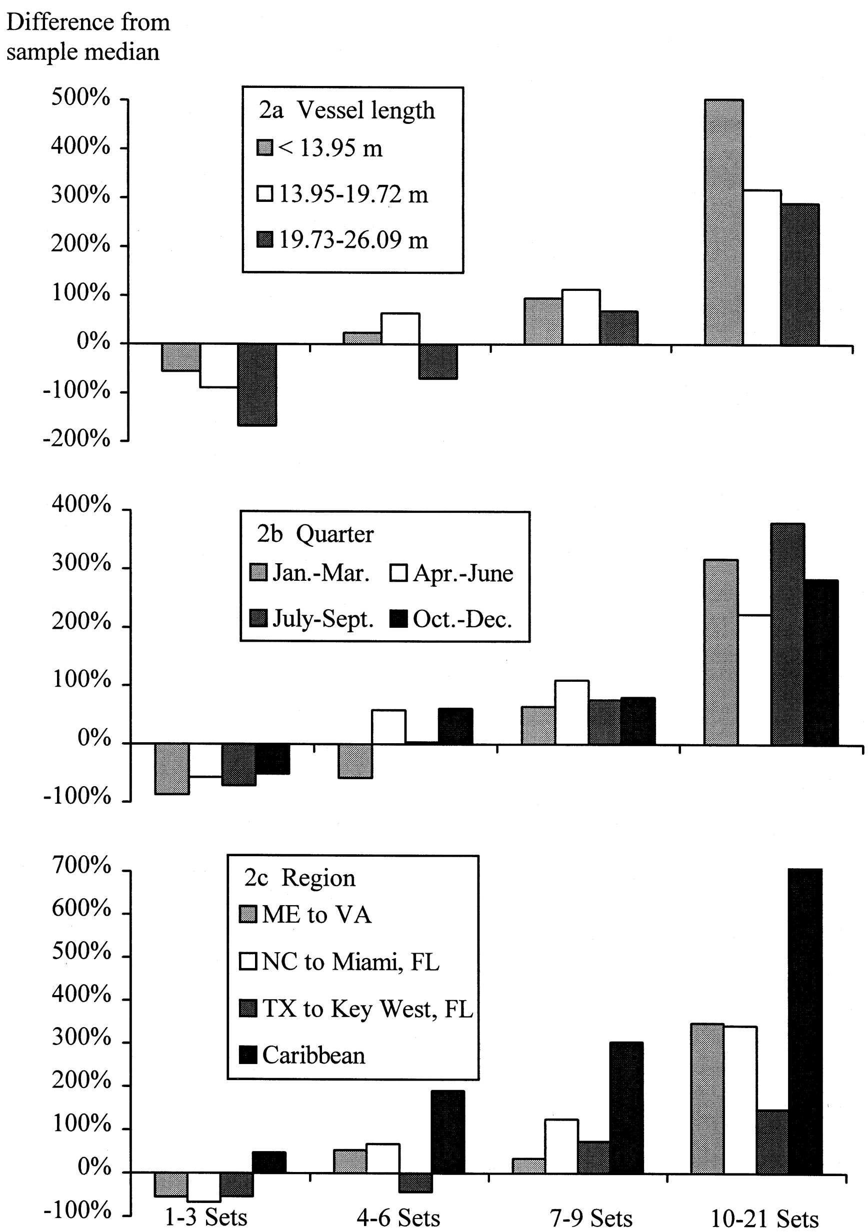

Figure 2.—Comparison of median net returns by number of sets.

[22] Curtis, R. 21 April 1999. Fisheries Statistics and Economics Division, NMFS, 1315 East-West Hwy, Silver Spring, MD 20910. Personal commun.

prior to the trip, 2) it has been considered the most complete level of production, and 3) NMFS has used this level for previous RIR and RFA analysis of this fleet.

The decision to focus on median statistics was determined by the skewed distributions of the variables and the NMFS statement (cited in the Introduction) that means may be misleading given the multi-species, multi-nature aspects of the PLL fleet. And, although the use of median values is not common in fisheries analysis, this particular descriptive statistic is applicable to fisheries for the same reasons it is used to compare housing prices and income. Additional benefits to using median values include the ability to identify the "average" or "typical" operation and that medians are robust to potential data "outliers" (e.g. trips with incomplete landing reports, aborted trips that show no landings but significant costs, or a small group of "highliners" that account for a relatively large share of landings). The focus on net returns to vessel owners to cover fixed costs was based on the data available and the NMFS recommendation that using gross returns or costs are less accurate. Lastly, the variables and variable levels used to define the subgroups in this analysis were based on those used by NMFS (i.e. species groups and regions), suggested by PLL vessel owners (i.e. number of sets), and considered important to industry members (i.e. season, vessel length, and swordfish targeting). Even so, these selections should not be considered the only or even the most appropriate variables to consider in future analysis. The selection of any particular variable(s) to analyze and, for that matter, descriptive statistic to use (mean and/or median) will depend on the proposed regulatory change and the analysis being conducted (RIR and/or RFA).

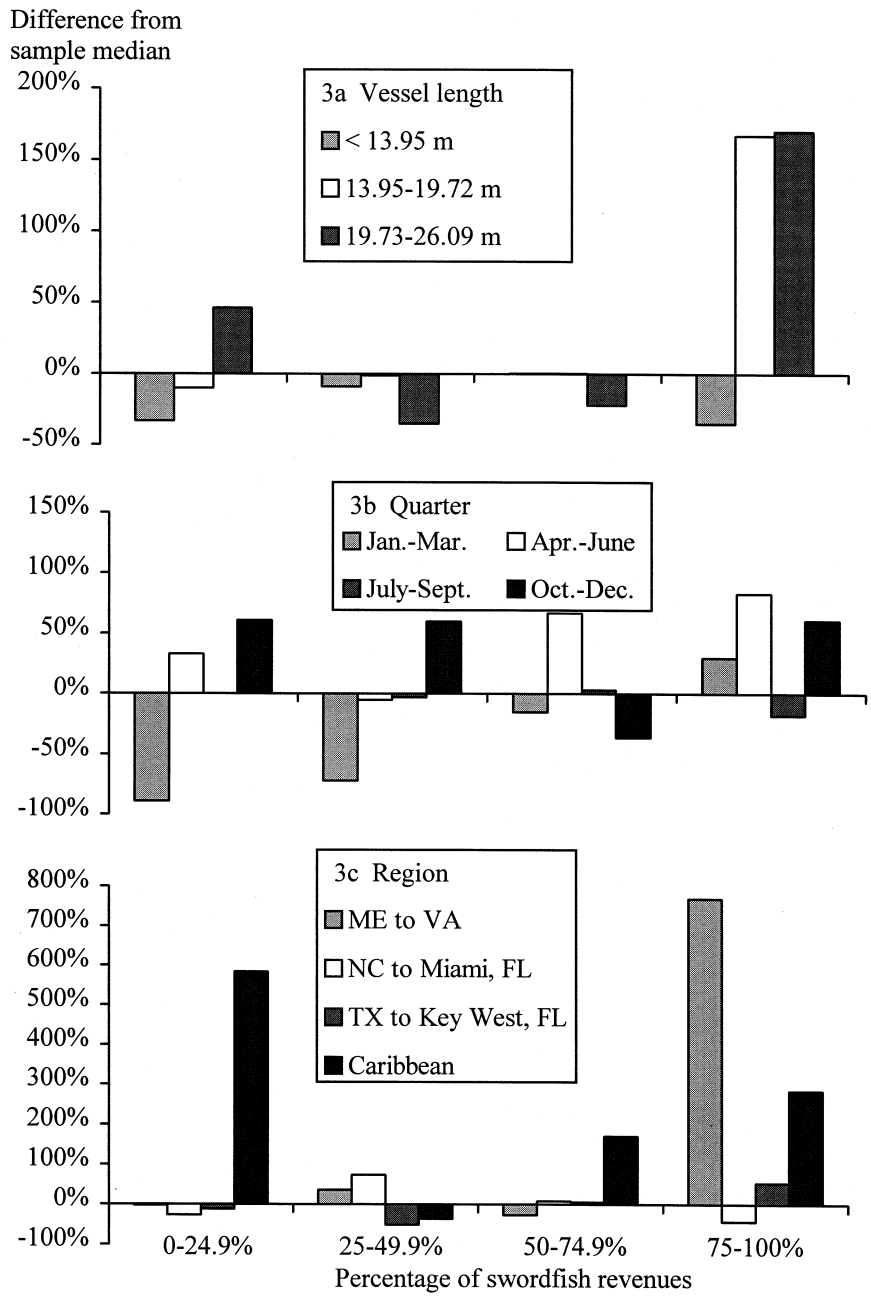

Figure 3.—Comparison of median net returns by swordfish revenues.

Using statistics from the aggregated data (Tables 2 and 3) implies that Atlantic PLL operations are homogeneous. These aggregate statistics may be useful in the broad context of Atlantic HMS species where the PLL fleet differs noticeably from other gear types; however, the variability in reported landings, set characteristics, vessel characteristics, and trip expenses (Tables 4–8, Fig. 1) suggests a significant degree of heterogeneity within the fleet. This heterogeneity was further evidenced by the finding that net economic returns, which vary with the composition of landings and trip costs, were dependent on vessel length, the number of sets per trip (i.e. trip length), temporal and spatial fisheries participation, and the percentage of revenues from swordfish (Tables 4–8). Moreover, the differences in net returns were magnified when the vessel, trip, and behavioral characteristics were considered jointly (Fig. 2–3). Consequently, although the aggregate statistics may accurately reflect relative differences in economic effects of proposed regulations between gear groups in Atlantic HMS fisheries, fleet heterogeneity may need to be considered in order to appropriately evaluate the economic effects (as required with the RIR and RFA) specific to the PLL gear group. Furthermore, with stratification into relatively homogeneous groups, the mean and median statistics will converge.

In summary, the aggregate mean net return exceeded the aggregate median by 97%. Thus, using the mean with trip frequency data to estimate fleet-wide economic net benefits as allowed under an RIR could overestimate the economic effect. Given that median returns for different stratifications deviated by as much as 714% from the aggregate median return, using the stratified statistics would likely increase the estimated economic effect(s). In other words, using "different industry segments" (such as the stratifications posed in this paper) for an RFA analysis as is allowed, could produce results that differ substantially from results derived by assuming the aggregate economic information appropriately reflects the economic conditions faced by all PLL vessels. Moreover, the stratifications produced larger differences in median net returns from the aggregate median (Fig. 1) than if gross revenues were used. Thus, using gross revenues and thereby ignoring costs could underestimate the relative economic effects experienced by different industry sectors. Lastly, given the differences in median revenues by species under the stratifications (i.e. Table 3 vs. Tables 4–8) indicates that using revenues from a single-species would substantially change the analysis due to relative differences in the cost of landing the various species.

In conclusion, this paper provides a detailed summary of recently available data on the Atlantic PLL fishery. The results confirm the existence of heterogeneity within the Atlantic PLL fleet. Although the finding of heterogeneity within this fleet may not be a surprising result, and the selection of variables and subgroups are debatable, this analysis provides quantitative evidence of just how important these decisions (as well as the choice to use gross revenues or net returns) are to the estimation of economic effects of proposed regulatory changes that are likely to affect the Atlantic PLL fleet. This paper was not, however, intended to be all-inclusive of information needed, but rather to show how the available data can be used to improve and complement previous analyses. To assure that management decisions regarding the fate of the fleet and the future of the fishery are informed and efficient, continued effort in data collection and economic analysis is paramount.

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